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Lo$s Control Data Sheet

- Design for Productivity
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HOME FIRE DETECTORS SAVE LIVES

Imagine that the time is 3 o'clock tomorrow morning. You and your family are fast asleep. A flame flickers in the living room. Minutes pass and the fire grows. Smoke fills your home. At 3:20 you are awakened by the sound of a child coughing. You smell smoke and suddenly you are fearfully wide awake with the realization that the house is on fire! You shout, "The house is on fire!" and frantically wake your wife or husband. With the intent of waking the rest of your family you rush to open your bedroom door, but the hallway is filled with flame and you are barely able to close the door again.

What will you do now? What are other members of your family doing, each in a different room? Are they awake? Have they escaped or are they lying unconscious from lethal smoke and fumes? Even if your family has planned and practiced a fire escape plan, it may even now be too late to use it!

How does this story end? We'll leave that up to you. But keep in mind that this is just how thousands of family members die each year. Whatever the outcome imagined, this story could have been told differently had an early-warning fire detector sounded its alarm at 3:05 a.m.

Your home is not exempt from fire. Fire destroys or damages more than 1,800 homes in the United States every day. It can happen to you.

Fire kills over 12,000 persons each year in the United States (about 350 in Texas). The majority of fires are caused by smoking materials, heaters, electrical devices and wiring, and cooking stoves and appliances. Early warning smoke detectors provide inexpensive protection for you and your family. You should install a fire alarm system in your home to alert quickly occupants of fire, day or night.

WHERE AND WHEN DO FIRES START?

A recent study of 400 residential fires involving 1,301 fatalities suggests that most fires start in living rooms and kitchens followed by bedrooms, bathrooms, and then garages and outside locations.

The study also showed that about an equal number of fires started during the day and at night. However, the vast majority of fires which resulted in multiple deaths (three or more persons) occurred during nighttime hours when people are generally asleep and unaware that a fire has started--until it is too late.

FIRE STAGES

The most important characteristic of a fire detection and alarm system is that it will give early warning of a fire danger so occupants can get out of the house safely and provide opportunity for them to extinguish the fire at an early stage.

Here are facts you should know about the stages in fire development:

1. Initial (incipient) stage--invisible particles of combustion are produced without significant amounts of heat, flame or smoke.

2. Second stage--mainly smoke produced. Little heat or flame is present and fire can be relatively easily extinguished, if detected.

3. Third stage--flames become clearly visible, heat increases, fire grows rapidly, and extinguishing becomes difficult.

The National Fire Protection Association (NFPA) reports that most people die in home fires from the lack of oxygen, from noxious gases, and from smoke, often before they wake up, and long before they are reached by flames (see Figure 1). Many synthetic materials used in carpeting and home furnishings give off deadly gases when they begin to smolder. For these reasons, the NFPA recommends the use of at least one smoke detector located in the hallway outside bedroom areas.

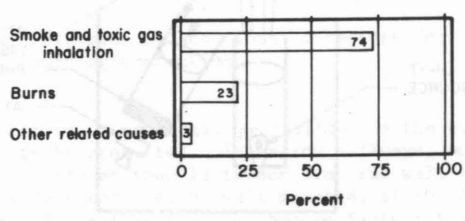

Figure 1. Leading causes of fire fatalities (U.S.)

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Fire officials estimate that 50% of life loss due to residence fires could be saved by installing early warning fire detection devices.

SMOKE DETECTORS

Smoke detectors are designed to sense fumes and smoke produced in the early stages of a fire. Smoke detectors for home use commonly contain a smoke sensing chamber, an alarm sounding mechanism, and electrical circuits housed in a single small unit. These units are made to hang from the ceiling or wall. Power is supplied from house current or batteries.

Usually, smoke detectors for residential use are of two types: ionization or photoelectric. Ionization units react when smoke interferes with the flow of electric current through an ionized sensing chamber (Figure 2). Photoelectric units react when smoke interferes with or scatters a beam of light sealed inside a sensing chamber (Figure 3).

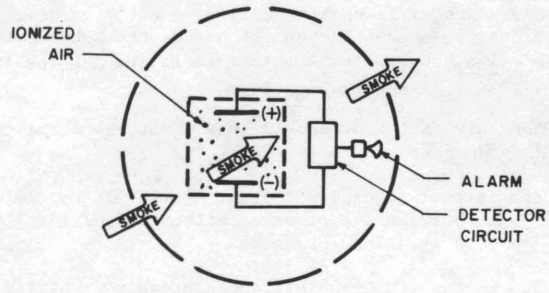

Figure 2. Ionization smoke detector. Combustion particles reduce electrical flow and trigger alarm.

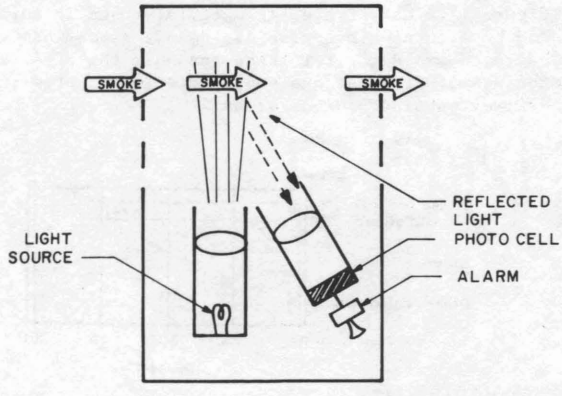

Figure 3. Pholoelectric smoke detector. Smoke particles deflect light beam and trigger alarm.

Both types of detectors work on the principle of sensing the presence of smoke. However, the photoelectric detector is best at sensing the larger smoke particles in the visible range. If a fire starts as a slow smoldering fire (upholstery) with smoke but without any flame, a good photoelectric unit would be superior to a good ionization unit in terms of detection time. In fact, the photoelectric detector may ignore fires involving flame with little visible smoke.

Conversely, a good ionization detector unit will respond faster to flaming fires or to invisible gaseous products of combustion such as carbon monoxide.

Some authorities suggest the minimum detection system would consist of both types of smoke detectors--one plug in photoelectric and one battery operated ionization unit. The differing sensitivities of the two types supplement each other nicely, each providing backup protection for the other as well as an additional alarm. Where only one unit is used (just outside sleeping areas) an ionization unit is recommended.

HEAT DETECTORS

Heat detectors should not be used alone as occupant fire warning devices, especially in sleeping areas, as fatalities may result from smoke and other combustion products before heat levels are reached which activate the detector.

Heat detectors are usually activated when surrounding heat levels reach 135 degrees F or more. For this reason, they must be placed very near potential fire hazards and usually a fire must be in full flame before they will work. This type detector should be considered only for areas such as kitchens, furnace rooms, and shops, where normal heat sources might make smoke detectors impractical.

BATTERY OR PLUG-IN TYPE?

Ionization type smoke detectors operate on either house current or batteries. The photoelectric detector always runs on house current since it requires more power. House current detectors are usually less expensive to buy and maintain but must be installed near an (unswitched) electrical outlet. House current detectors operate as long as they receive electricity. The chances are unlikely that electricity in a home will be disrupted in a fire, as power fails in less than 10 percent of all home fires.

Battery powered detectors are easily installed in areas without an electric outlet or where a visible cord is undesirable. Being independent of house current, they operate in case of power outage. Batteries weaken with age, however, and must be checked and replaced at least once each year to assure reliability (photoelectric lamp bulbs must also be checked and replaced periodically).

BUYING TIPS

* Don't be frightened into a quick purchase. Get at least two or three price estimates from different sources.

* Buy only alarms which carry labels showing they have passed the tests to be approved by UL (Underwriter's Laboratories), FM (Factory Mutual System), ICBO (International Conference of Building Officials) or other testing organizations.

* Be sure the units you buy come with an instruction booklet covering installation, operation, testing, and maintenance.

* Buy only those units for which replacement batteries or bulbs are readily available.

* Purchase only from a reputable firm and understand the guarentee or warranty for the unit you select.

* Test all units immediately after installation. If installed by a contractor, have them test the units in your presence.

LOCATION AND MOUNTING OF UNITS

The number and proper location of fire detectors is very important if they are to give adequate protection, and this depends largely upon the type of house in which you live.

The "basic" minimal detection system should consist of one ionization smoke detector outside each sleeping area and one additional unit (photoelectric or ionization) on each non-sleeping living level (Figures 4 and 5).

If you live in a single story house with all bedrooms leading to a common living area, mount one ionization smoke detector on the ceiling or wall between the bedrooms and living rooms (Figure 4).

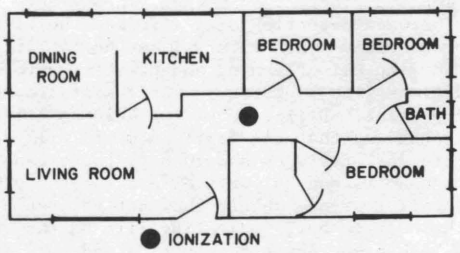

Figure 4. In a one floor plan with only one sleeping area, the smoke detector should be placed between the sleeping area and the rest of the house.

If your bedrooms are at opposite ends of the house or on more than one floor, place ionization smoke detectors outside each of these sleeping areas (Figure 5).

Consideration might also be given to installing additional detectors for maximum protection (Figures 5) as follows:

* Install a photoelectric detector in each bedroom occupied by a smoker.

* Install ionization or photoelectric units in each room or major section of a house as appropriate for the room activity and contents.

* In the kitchen area it is better to install a heat detector rather than a smoke detector. Smoke and other combustion particles from ordinary cooking may set off the alarm of a smoke detector if the unit is placed too close to the stove.

* Heat detectors are also recommended for attics, garages, barns, shops, and other outbuildings where higher than normal temperatures are encountered and where airborne dust might be present that could set off a smoke detector.

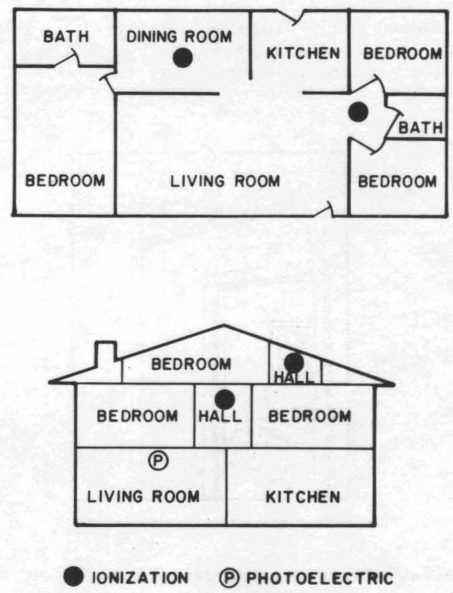

Figure 5. In homes with more than one bedroom area, a smoke detector should be used to protect each separate sleeping area.

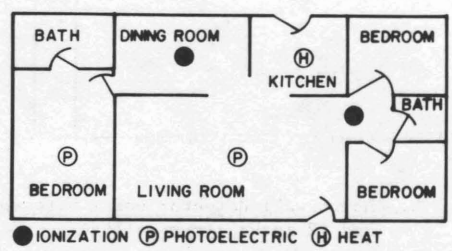

Figure 6. Placement of additional detectors for maximum warning protection.

Mount detectors on ceilings, preferably in the center of the space to be protected. In narrow hallways, mount detectors no closer than 12 inches from the wall (Figure 7a). If a detector must be wall mounted, it should be mounted no closer than 6 inches and no farther than 12 inches from the ceiling. This is to avoid the dead air space as illustrated in Figure 7b. Locations where strong drafts may occur such as near air registers and open doors and windows, should also be avoided.

It should be noted that authorities differ as to whether bedroom doors should be open or closed while occupants are sleeping. The closed-door theory maintains that the door could keep fire out of a bedroom long enough to allow escape through a window emergency route. The open door theory contends that it is more difficult to hear the alarm through a closed door and if a fire starts within a bedroom, the central fire detector located outside in the hall will not detect the fire quickly enough with doors closed. An alternative might be to install separate detectors in bedrooms if you prefer to keep doors closed while sleeping. Also, if a family member has hearing difficulties or insists on smoking in bed, install a detector directly over the bed.

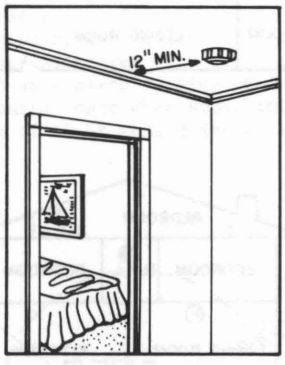

Figure 7a. Mount ceiling detector units at least 12 inches from walls.

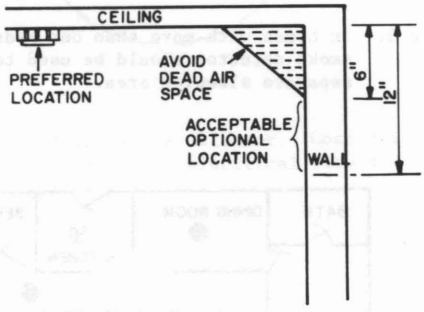

Figure 7b. Mount wall detector units between 6 inches and 12 inches from ceiling.

TESTING AND MAINTENANCE

Test each unit after installation as suggested by the manufacturer. Familiarize all family members with alarm sound. Periodically check batteries and light bulb; if either is defective, replace. Always keep a spare replacement light bulb on hand for photoelectric units. Yearly vacuuming of ionization detectors is a recommended practice; photoelectric detectors should also be vacuumed and filters cleaned annually. Also check for and remove insects that have crawled into detector housings, as their presence can cause false alarms.

Prudent owners should check the operation of their detectors at least once a month. Some models provide a test button or lever; others require that smoke from a cigarette or snuffed candle be blown into the detector. Plug-in units should be tested after lightning storms to make sure that a lightning-caused voltage surge has not damaged the detector.

YOUR JOB IS NOT DONE

The National Fire Protection Association suggests that "reasonable home fire safety" can be achieved by following this three point program:

* Minimize fire hazards. Keep stoves and furnace rooms clean. Remove trash and garbage daily. Keep heating and electrical equipment properly maintained. Use properly-sized wiring and fuses. Never smoke in bed. Do not leave children at home alone. Exercise caution when using flammable liquids. Never store or use gasoline inside the house.

* Develop and practice an escape plan. There is little time between detection of a fire and the time it becomes deadly--this interval may be as little as one or two minutes. Planning and practicing for fire conditions with emphasis on rapid exit from the home is important. Drills should be held at least every six months so that all family members will know exactly what to do. Everyone should have two escape routes--one through doors and hallways or stairs; the other through windows. Everyone should know not to open bedroom doors if the door is hot, indicating fire on the other side. Establish a meeting place outside and away from the house so family members can be quickly located.

* Provide a fire warning system. The systems described above can warn occupants of a fire and give them a chance to escape--and live.

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